

# 1. Introduction

## 1.1. What is Panoply?

Panoply is a data visualization application, designed for the display of climatology, meteorology, oceanography, and other Earth science data saved in the netCDF (Network Common Data Format), including datasets saved in the new netCDF-4 format\*.

Panoply plots two-dimensional arrays of data, which can be “sliced” from variables which have more than two dimensions. It can:

- Plot longitude-latitude arrays as global or regional maps, using any of over 80 map projections. Maps can be overlaid with continent outlines or masks.
- Plot zonal average curves of longitude-latitude data.
- Plot latitude-vertical arrays.
- Plot time-latitude arrays, i.e., make keograms.

Panoply can also combine two arrays of data by differencing, by averaging, or by treating them as vector components.

More than 40 color tables are provided for use in the plot scale to represent data values. Alternative color tables may also be applied if they are in one of several widely used formats.

Plots may be saved as image files in GIF, PNG, PDF, or Postscript format.

## 1.2. Java Required

Because Panoply is a cross-platform application, intended for use on many types of computer operating systems with minimal use of platform-specific code, it has been written in the Java programming language. In order to run Panoply, your computer must have a Java Runtime Environment (JRE) installed, specifically a JRE for Java 5.0 (also called Java 1.5) or better.

If your computer uses the Mac OS X operating system, you will probably have Java 5.0 installed if you are using either OS X 10.4 (“Tiger”) or OS X 10.5 (“Leopard”). However, if you are using OS X 10.4 but have not been careful about keeping your operating system up-to-date, it might only have Java 1.4. Running the system Software Update utility will update your computer’s Java version, if necessary. Computers using versions of OS X older than 10.4 do not include Java 5.0, nor can you install it on them.

On Windows computers, Java probably does not come pre-installed and you will have to install it yourself. To do so, go to the Java.com website at <http://www.java.com/>, click on the “Free Java Download” link, and follow any instructions that it provides. The download and installation should be mostly automatic, requiring only that you click on one or two approval or licensing buttons. You will need Administrator privileges in order to successfully complete the installation.

On other types of desktop computers (e.g., Linux), Java may or may not be pre-installed. If not, then again, go to the Java.com website, click on the “Free Java Download” link, and follow the instructions. The procedure may be more complex than that for Windows, probably requiring that you manually download a Java package and then execute two or three command line calls to install it.

Downloads from the Java.com website may prompt you to download additional software, such as web browser plug-ins and other programs. None of these optional “opt out” downloads are required to install Java or to use Panoply, so you may skip any such offering that you are offered.

## 1.3. Downloading and Installing Panoply

The current version of Panoply can be downloaded from the Panoply webpage on the NASA Goddard Institute for Space Studies website at <http://www.giss.nasa.gov/tools/panoply/>. Depending on what type of computer

\* Versions of Panoply before Panoply 2.7 can only open netCDF-3 files.

you use, you would click the appropriate link on that page to download the Mac OS X, Windows, or “generic” version of Panoply.

### 1.3.1. Installing Panoply for Mac OS X

The Mac OS X version of Panoply comes as a disk image (DMG file). Once downloaded, you may install Panoply by double-clicking the `PanoplyOSX.dmg` icon in your downloads folder. Then drag the PanoplyOSX folder out of the mounted disk image on your desktop to wherever you prefer to keep the application, either your user Applications folder or the system-wide Applications folder.

To run Panoply on Mac OS X, just double-click on the `Panoply.app` application icon.

The Panoply package for OS X will also notify the operating system that it can open files with a `.nc`, `.nc4` or `.ncml` filename extension. This means that unless another application has also done so, double-clicking a netCDF file named with one of these extensions will cause the system to launch Panoply (if it’s not already running) and instruct it to open the file.

### 1.3.2. Installing Panoply for Windows

The Windows version of Panoply comes as a ZIP archive. After it is downloaded, drag the PanoplyWin folder out of the archive and into your preferred applications folder.

To run Panoply on Windows, just double-click on the `Panoply.exe` application icon.

Do not leave the Panoply application in the ZIP archive and try to run it by double-clicking the application icon inside the archive folder. If you do so, it will not be able to find certain support files and it will crash.

Please note that Panoply for Windows also includes files named `Panoply.jar` and `msvcr71.dll`. These files must remain in the PanoplyWin folder along with the `Panoply.exe` application. If they are removed, then Panoply will not work.

If on launching Panoply on Windows you are presented with a small error dialog displaying a stop sign but no explanatory text, this probably means that you do not have Java installed on your computer. See Sect. 1.2 above to correct this.

### 1.3.3. Installing Panoply on Other Personal Computers

The “generic” version of Panoply — which can be used on Linux, OS/2 and other platforms — comes as either a TGZ or ZIP archive. Once you have downloaded and uncompressed the archive, just move the PanoplyJ directory to your preferred applications directory.

The user desktop on operating systems such as Linux and OS/2 may allow you to start Panoply by double-clicking on the `Panoply.jar` file icon. If not, then you must start Panoply from the command line. Normally, this would be done by moving to the directory in which it is located and then typing the following shell command:

```
java -jar Panoply.jar
```

However, both of these ways of starting Panoply will probably result in it not claiming enough memory with which to work. Java applications are by default assigned only 64 MB of memory, and Panoply works more reliably if it is given more. In fact, it may not work at all with 64MB of memory if you try to plot a high-resolution dataset (e.g., longitude-latitude data gridded at finer than 0.5° resolution).

The Mac OS X and Windows versions of Panoply are configured to automatically request as much as 512 MB of memory from your operating system, but on other platforms you must manually do so by starting Panoply from the command line and including the memory option. The following shell command starts Panoply and requests 512 MB of memory:

```
java -Xmx512m -jar Panoply.jar
```

### 1.3.4. Uninstalling Panoply

Should you decide to remove Panoply from your computer, there are just a couple steps.

First, delete the Panoply application folder from wherever you placed it.

Second, delete your Panoply user preferences. Its location depends on the type of computer you are using:

- On Mac OS X, go to your home directory. Open the `Library` folder, and then the `Preferences` folder within. In `Preferences`, delete the two files named `gov.nasa.giss.Panoply.plist` and `gov.nasa.giss.Panoply.prefs.xml`.
- On Windows, Linux, OS/2, etc., go to your home directory. This location will vary depending on your operating system. On Windows XP it is `C:\Documents and Settings\Username`; on Linux it is `/home/username`. There you will find a directory named `.gissjava` and within it a file named `panoply.xml`. Delete this XML file.

## 1.4. Support Files

In addition to the Panoply application, the Panoply distribution package includes support files located in folders named `colorbars`, which contains numerous color tables, and `overlays`, which contains continent mask and outline files. These two folders must be kept in the same location as the application so that Panoply can find the support files when it starts up. If not, you will have to manually open each support file that you want to use.

Appendix B of this user guide describes the various types of color tables that Panoply can read and provides some links for possible sources of additional color tables.

Appendix D describes the overlay files that are included in the Panoply distribution, and also another dozen that may be downloaded from the Panoply website.

Any additional color tables or continent overlays that you download should be placed in the appropriate support directory so that Panoply will automatically read them in when it is next started.

## 1.5. Acknowledgments

The Panoply application includes the following third-party, open-source Java libraries, used under various licenses as listed. You may view the licenses and download the source code for these libraries at the URLs provided.

- **NetCDF Java library**, version 4.0.38. Copyright © 1993-2009 University Corporation for Atmospheric Research/Unidata. Available at <http://www.unidata.ucar.edu/software/netcdf-java/>. Used under terms of the GNU Lesser General Public License.

The NetCDF Java library in turn includes and requires:

**Apache Commons HttpClient, Logging, and Codec libraries**. Copyright © 1999-2008 the Apache Software Foundation. Used under terms of the Apache license.

**GRIB library**. By the University Corporation for Atmospheric Research/Unidata. Described at <http://www.unidata.ucar.edu/downloads/decoders/>.

**OPeNDAP library**. By the OPeNDAP Project. Copyright © the California Institute Technology, Oregon State University, et al. Described at <http://www.opendap.org/>.

**SLF4J library**, version 1.5.6. Copyright © 2004-2008 SLF4J.org and QOS.ch. Described at <http://www.slf4j.org/>. Used under terms of the X11 License.

- **iText Java-PDF library**, version 2.0. Copyright © 1999-2007 by Bruno Lowagie and Paulo Soares. Available at <http://www.lowagie.com/iText/>. Used under terms of the Mozilla Public License.
- **JDOM library**, version 1.1. Copyright © 2000-2007 Jason Hunter and Brett McLaughlin. Available at <http://www.jdom.org/>. Used under terms of a modified Apache License.
- **QuantizeFilter and related classes**. Copyright © 1998-2006 Jerry Huxtable. Available at <http://www.jhlab.com/ip/>. Used under terms of the Apache License, Version 2.0.
- **Exploding Pixels' MacWidgets for Java**. Copyright © 2008-2009 Kenneth Orr. Available at <http://explodingpixels.wordpress.com/> and <http://code.google.com/p/macwidgets/>.

Some color tables included in the Panoply software package were obtained from J.J. Green's cpt-city website, <http://www.cpt-city.org.uk/>. See that website for many more CPT format color tables compatible with Panoply.

## 1.6. Contact the Author

If you would like to

- Report a bug in Panoply,
- Receive e-mail when new versions of Panoply are released,
- Assist with localization of Panoply for non-English languages, or
- Become a Panoply beta tester

then please contact the author, Robert B. Schmunk, by e-mail at [Robert.B.Schmunk@nasa.gov](mailto:Robert.B.Schmunk@nasa.gov) or by post at NASA Goddard Institute for Space Studies, 2880 Broadway, New York, NY 10025.

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